

introduces fluorine into both of the starting compounds of the PBO, i.e., the o-aminophenol and the aromatic dicarboxylic acid.

It had been very difficult to obtain fluorinated PBO's with sufficiently high molecular weight due to the poor reactivity of a fluorinated o-aminophenol starting compound. This is because of the nucleophilicity of the fluorine-containing o-aminophenol compound (electron-withdrawing of the fluorinated group). Thus, the resulting fluorinated PBO's using fluorinated o-aminophenol had poor mechanical properties. Moreover, the cured polymers were solvent susceptible and therefore it was difficult to apply the polymers in multi-layer circuit boards. It was thought in the art that it was essential to merely increase the fluorine content in the PBO's to reduce the dielectric constant.

In contrast, in order to obtain physically strong, solvent resistant polymers with a low dielectric constant, precursors of the fluorinated PBO's are end-capped with thermosetting groups to obtain fluorinated PBO's with sufficiently high molecular weight.

C. Rejections in Final Action

1. Rejection of Claim 1-8

Claims 1-8 are rejected as being made obvious by the combination of Murayama et al. (USP 6,297,351), cited for the use of a fluorinated o-aminophenol polymer, but without end caps, and Smith et al. (USP 6,124,372), cited for the including thermosetting end groups into PBO's to enable crosslinking and provide benefits including low water sorption and high thermal strength.

2. Rejection of Claims 1-4 and 6-7

These claims are rejected as being made obvious by the combination of Sezi et al. (USP 6,153,350) and Smith et al. Again, the primary reference is cited for teaching PBO's and the secondary for teaching end caps.

3. Rejection of Claims 5 and 8

These claims, which relate to forming a multilayer circuit board with the cured film, are rejected based on the Sezi et al./Smith et al. combination discussed above (which combination is acknowledged to lack a teaching of a multilayer circuit board), and Murayama et al.'s use of PBO's in making multilayer circuit boards.

D. Response to Rejections

For the following reasons, it is respectfully submitted that the present invention, as recited by claims 1-8, was not rendered obvious by the cited art.

As acknowledged by the Examiner, the primary references Murayama et al. and Sezi et al. do not disclose or teach the introduction of thermosetting end groups into fluorinated PBO's. Accordingly, under Graham v. John Deere, the issue is whether one of ordinary skill would have added thermosetting end groups into precursors of fluorinated PBO's, as recited by claims 1-8, based on Smith et al. It is respectfully submitted that the answer is no.

The secondary reference Smith et al. does not provide a motivation to introduce thermosetting end groups into fluorinated PBO's based on a fluorinated o-aminophenol compound precursor and a fluorinated aromatic dicarboxylic acid compound precursor, as recited in claim 1 (once amended). Smith et al. teaches fluorinated PBO's based on a non-fluorinated o-aminophenol compound and a fluorinated aromatic dicarboxylic acid compound, into which thermosetting end groups are introduced, not on a fluorinated o-aminophenol compound and a fluorinated aromatic dicarboxylic acid compound. As a result of the Smith et al. composition, the polymerization reaction necessarily proceeds rapidly due to the presence of the non-fluorinated o-aminophenol compound, and therefore the resulting fluorinated PBO's have a high molecular weight. Thus, in Smith et al., the thermosetting end groups are introduced in order to obtain curable PBO's, not to increase the molecular weight of the resulting polymers.

That is, in Smith et al., there is no necessity to improve the mechanical strength and solvent resistance in the resulting PBO's, since these properties are sufficiently high due to the sufficiently high molecular weight of the polymers, even in the absence of the thermosetting end groups.

II. CONCLUSION

In view of the foregoing actions taken by Applicant, it is believed this Rule 116 Response places this application in condition for allowance, and therefore should be entered and a Notice of Allowance issued for claims 1-8.

If there are any additional fees associated with this Response, please charge same to our Deposit Account No. 19-3935.

Finally, if there are any formal matters remaining after this Response, the undersigned would appreciate a telephone conference with the Examiner to attend to these matters.

Respectfully submitted,

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